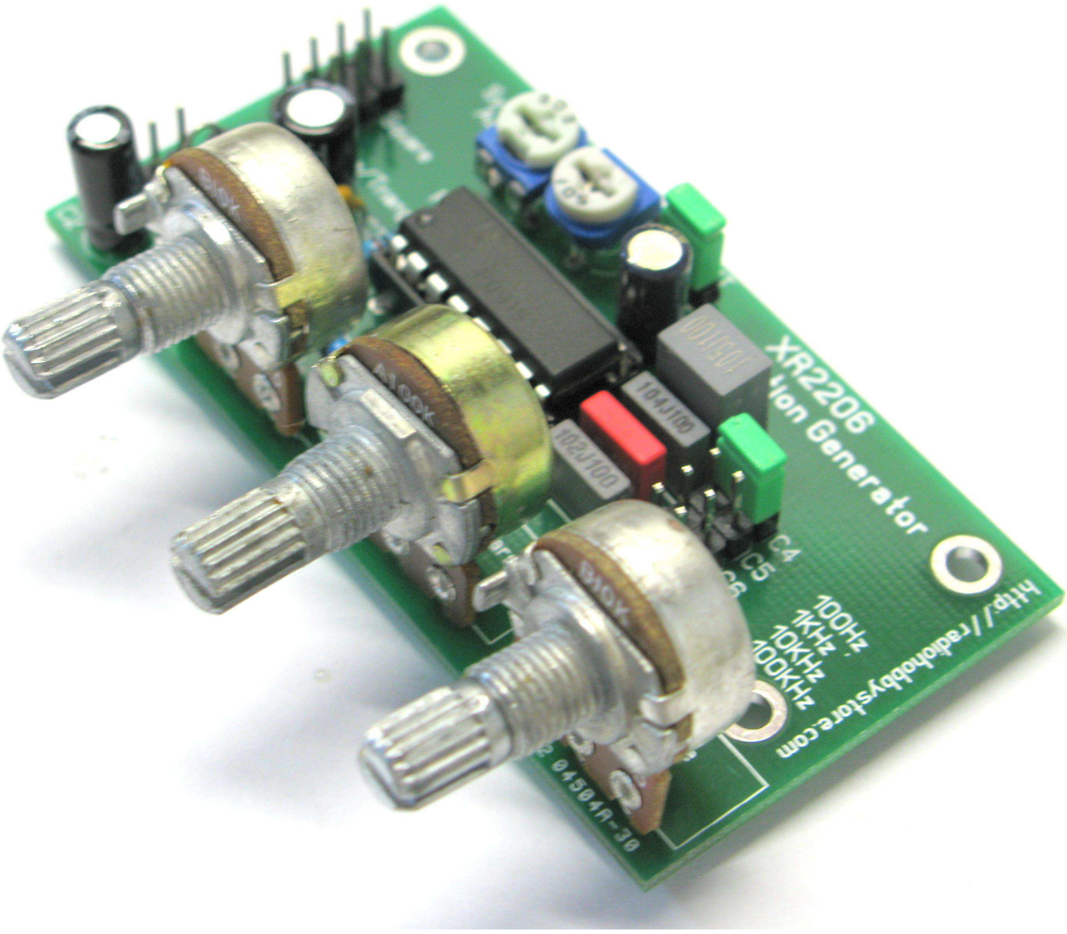
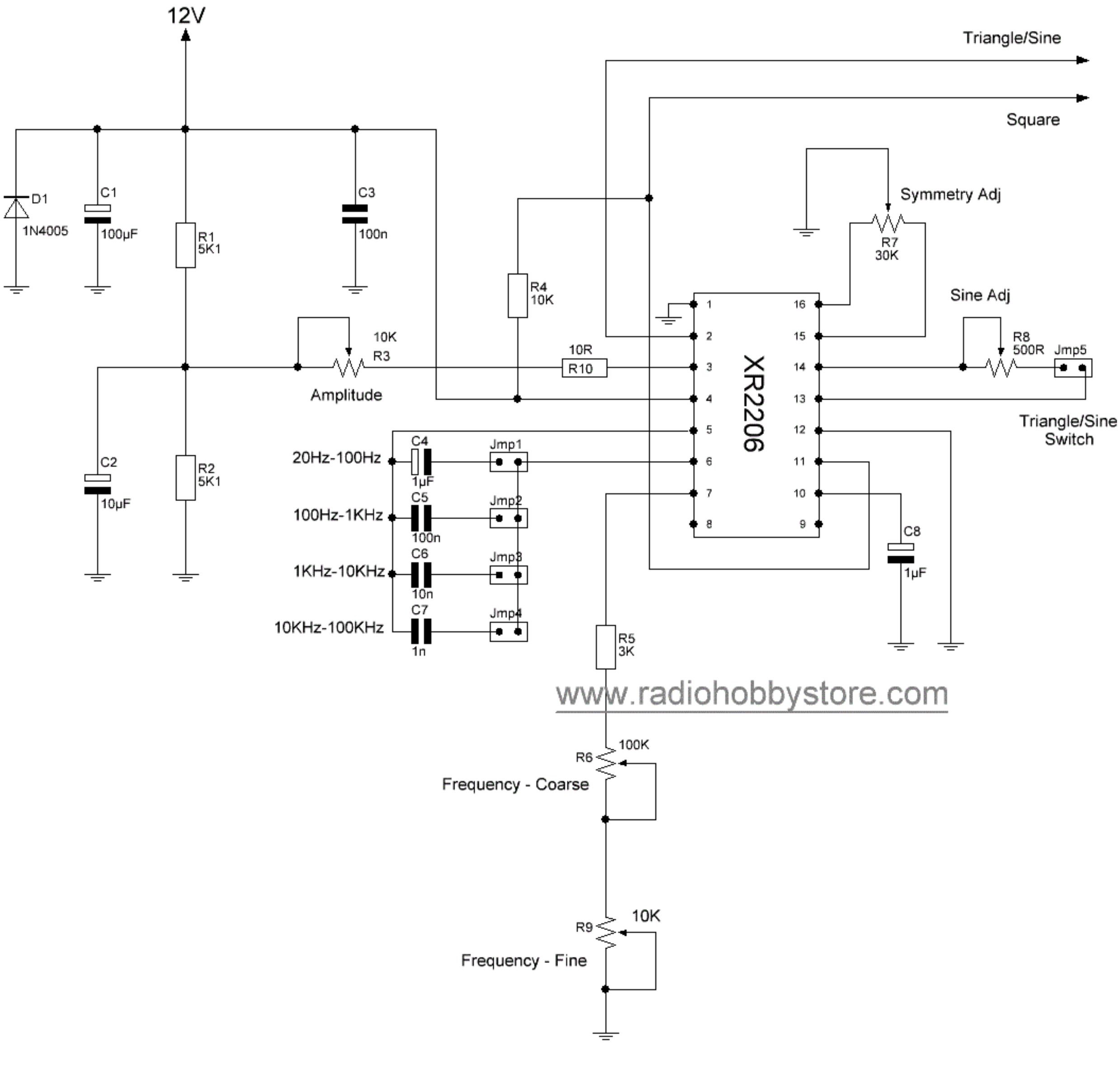
DIY Function Generator
XR2206

20Hz – 100KHz



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12V
D1
1N4005
C1
100µF
R1
5K1
C3
100n
R4
10K
Triangle/Sine
Square
Symmetry Adj
R7
30K
Sine Adj
R8
500R
Jmp5
Triangle/Sine
Switch
XR2206
10K
R3
Amplitude
10R
R10
C2
10µF
R2
5K1
20Hz-100Hz
100Hz-1KHz
1KHz-10KHz
10KHz-100KHz
C4
1µF
C5
100n
C6
10n
C7
1n
Jmp1
Jmp2
Jmp3
Jmp4
C8
1µF
R5
3K
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R6
100K
Frequency - Coarse
R9
10K
Frequency - Fine

Components List:

Resistors:
R1, R2 – 1% Metal Film 5K1
R4 – 1% Metal Film 10K
R5 – 1% Metal Film 3K
R10 – 5% Carbon Film 10R
R3, R9 – Potentiometer 10K (B10K)
R6 – Potentiometer 100K (A100K)
R7 – Trimmer 30K (303)
R8 – Trimmer 500R (501)

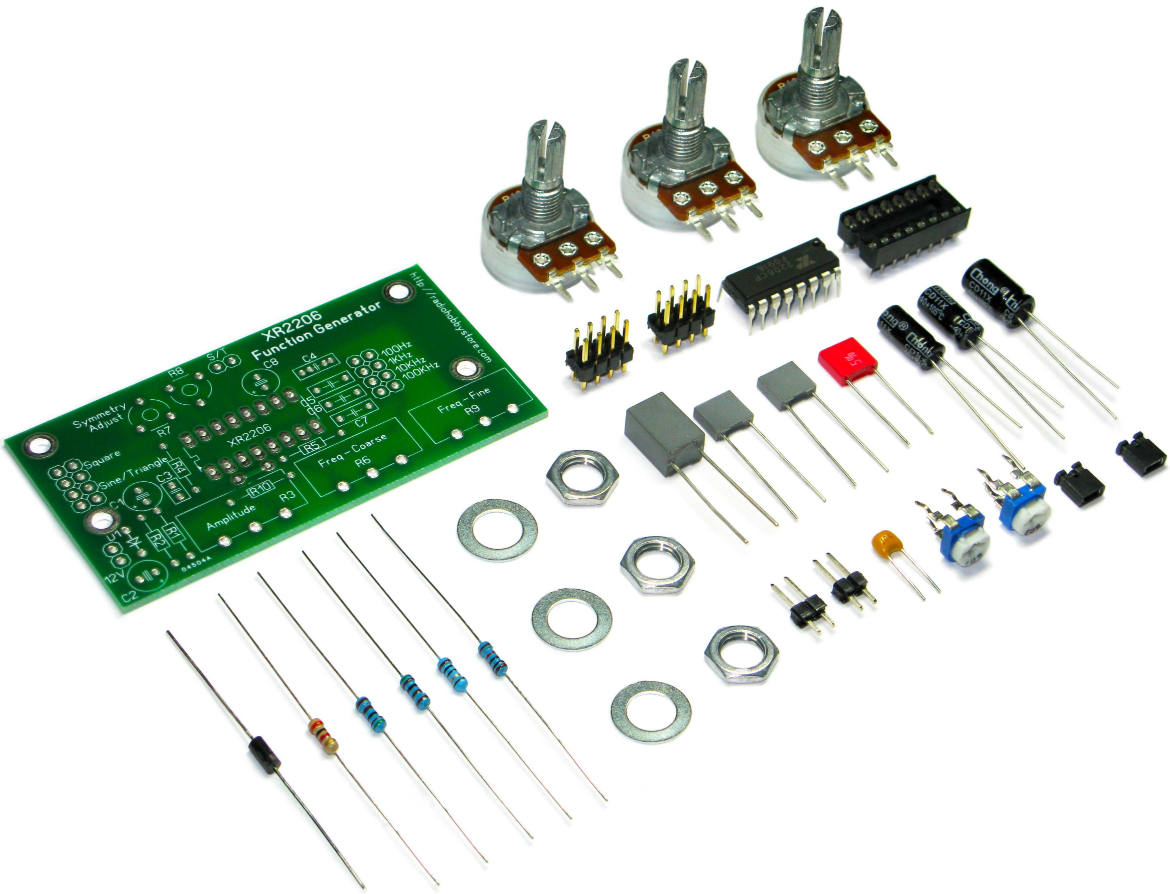
Capacitors:
C1 – 100uF Electrolytic
C2 – 10uF Electrolytic
C3 – 0.1uF, 100nF 50V Ceramic (104)
C4 – 1uF 63V Polyester Film Box (105)
C5 – 0.1uF, 100nF 63V Polyester Film Box (104)
C6 – 0.01uF, 10nF 63V Polyester Film Box (103)
C7 – 0.001uF, 1nF 63V Polyester Film Box (102)
C8 – 1uF Electrolytic

Other:
D1 – 1N4005 diode
IC XR2206CP
DIP16 IC Socket
20 Pin 2.54mm Male
2 Jumper Cup
3 Nuts for Rotary Potentiometer
3 Washers for Rotary Potentiometer
Double Layer PCB

* Some components value may vary! For example: electrolytic capacitors voltage may be 50V rated or polyester capacitors voltage may be 100V.

** R1, R2 resistors are control voltage offset.

*** R7 Trimmer 30K have to be ignored if you can't reach a oscilloscope to calibrate the XR2206 Function Generator. Just do not install it!



XR2206 DIY Function Generator Components

Technical Specification:

- Frequency's: 20Hz to 100KHz in 4 steps ranges
- Waveforms: Sine, Triangle, Square
- Supply Voltage: 12V
- Supply Current: 12-20mA
- PCB Dimensions: 73 x 38 mm

Sine Wave:

- Amplitude: 0.05 - 2V AC Peak to Peak at 12V DC
- Distortion without adjustment: 2.5%
- Distortion with adjustment: less than 1%
- Output Impedance: 600 Ohm
- Amplitude Stability: 0.5 dB

Triangle Wave:

- Amplitude: 0.05 - 4V AC Peak to Peak at 12V
- Linearity: 1%
- Output Impedance: 600 Ohm

Square Wave:

- Amplitude: 11V AC Peak to Peak at 12V
- Rise time: 250 ns at 1KHz
- Fall time: 50 ns at 1KHz

*Please take note, the square wave output is non-adjustable! The square wave output is “Open Collector” type and R4 is the pull-up resistor to VCC.

Introduction.

This is XR2206 based Function Generator DIY Kit. The circuit was taken from IC's datasheet and was adapted to the project requirements.

Many of XR2206 based DIY kits usually needs to perform adjustments before using, but not all people who buy it will have oscilloscope at home. Also if you are not supply specific DC voltage level to the IC, you will get clipped output signals and distorted signal outputs.

Because of it, we decided to create XR2206 DIY Kit which can be used without any adjustments and also have options if you want to have full control on it with a scope. Our DIY Kit will fit people who can't reach oscilloscope to calibrate. They will get XR2206 Function Generator with technical specifications we listed above. And also our DIY Kit may be interesting for people who have scope and can calibrate the XR2206 function generator to 0.5% THD.

The XR2206 IC have 20 ppm/C frequency stability. We also use in our project polyester film capacitors to reduce temperature drifts.

The DIY Kit have 4 steps frequency's range. You can use jumper cup or any 1 Pole 4 Position Rotary Switch for selection of the working range.

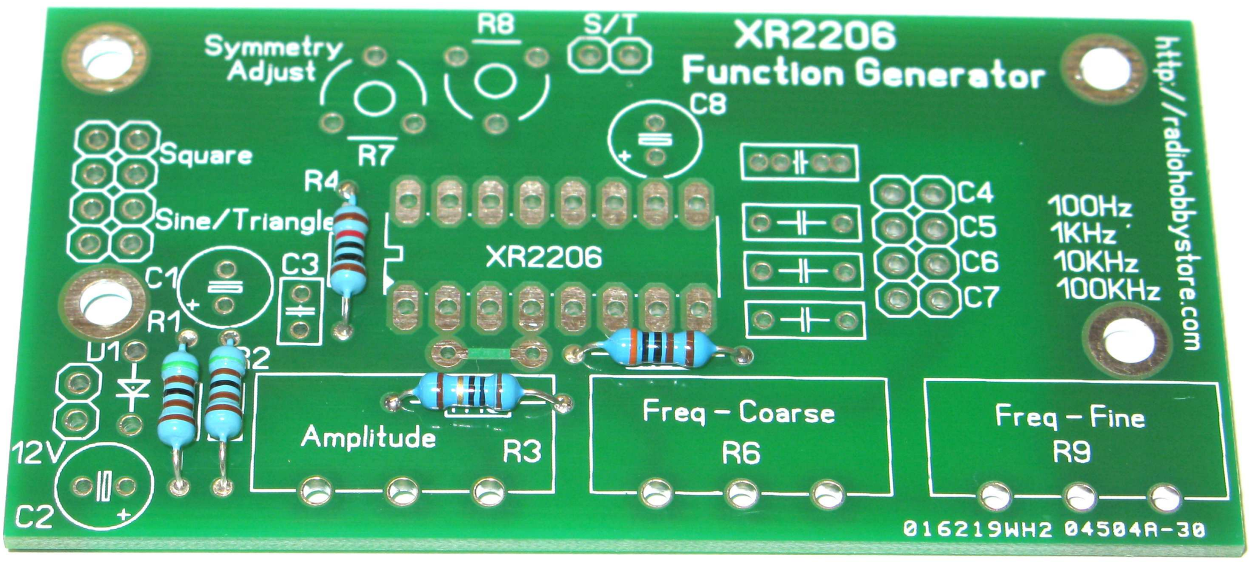
We designed the XR2206 DIY Kit for 12V regulated power supply. You can use simple LM317 or LM7812 power supply for this project. Your power supply must be regulated to guarantee a clear output signal.

The square wave output is come from pin 11 of the IC. The sine and triangle waveform is come from pin 2. Please follow Components Diagram to determinate frequency's outputs. The sine or triangle wave output can be toggled by jumper 5 (S/T), closed for sine wave. You can also connect any 1P2T external switch button to the PCB board for selecting sine/triangle wave output. The sine/triangle and square wave have doubled outputs on the PCB. It will allow you to connect a frequency counter in parallel with signal output.

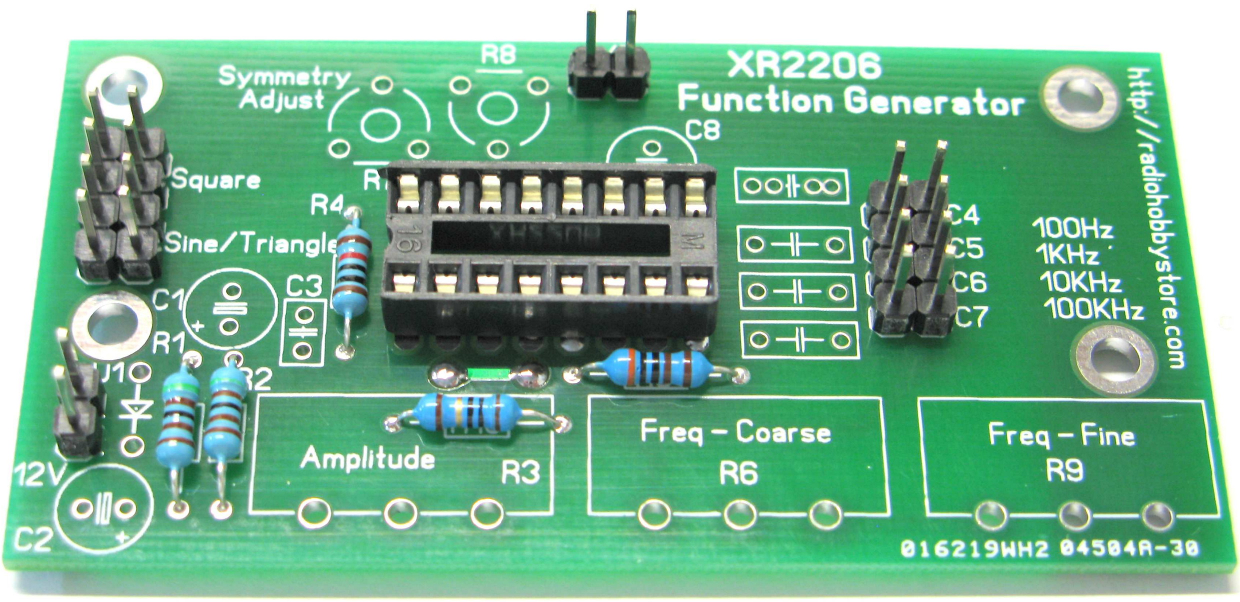
If you planning to use the function generator with low impedance load, please add an external buffer stage amplifier.

Assembling and Soldering.

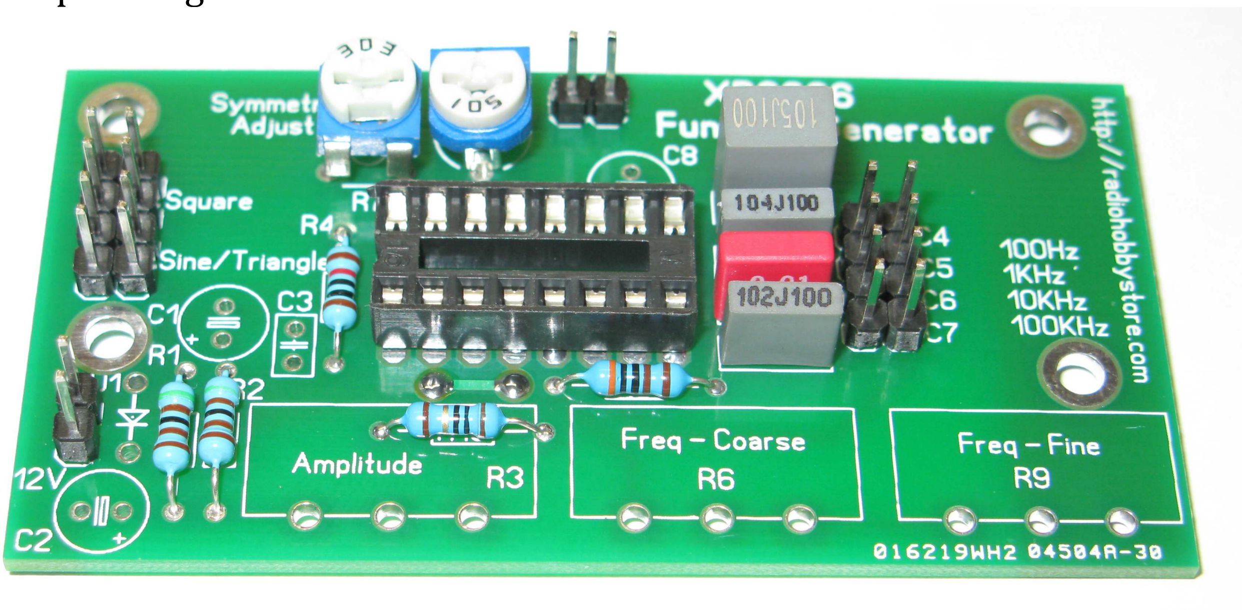
1. Install R1, R2, R4, R5, R10 resistors.



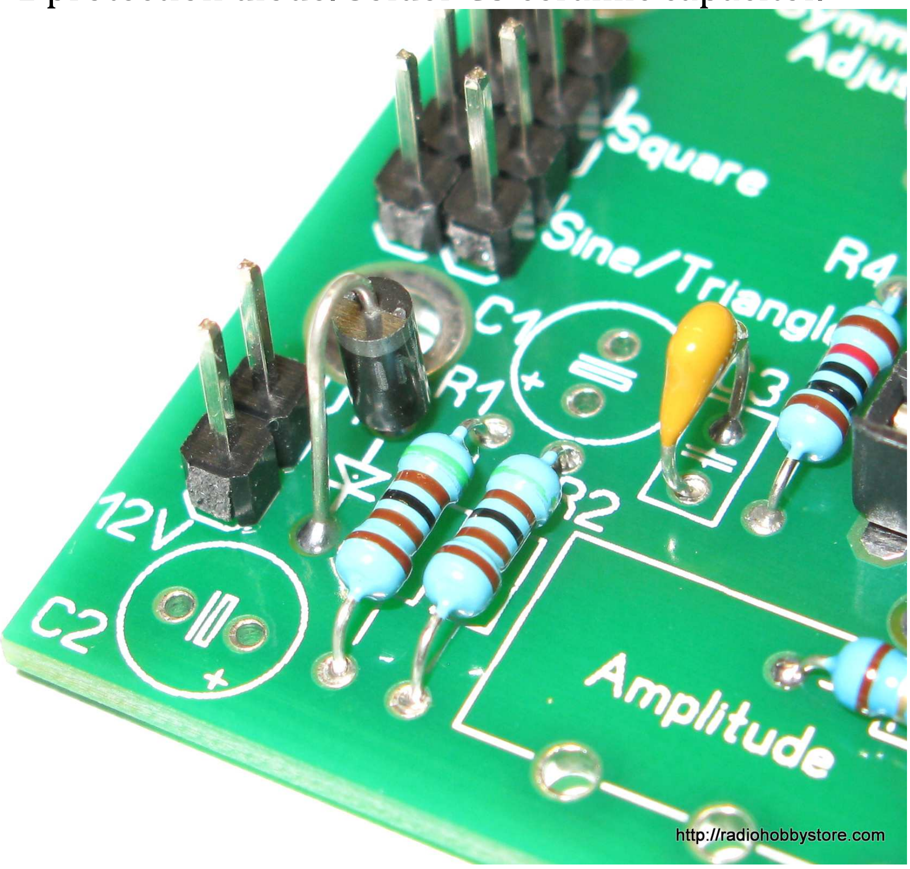
2. Solder 16 Pin IC Socket. Install and solder 2.54mm Male Pins regards to the picture. Remember to fill with a solder the link pads. The PCB have only one link on the top side, close to R10 and R5 resistors.



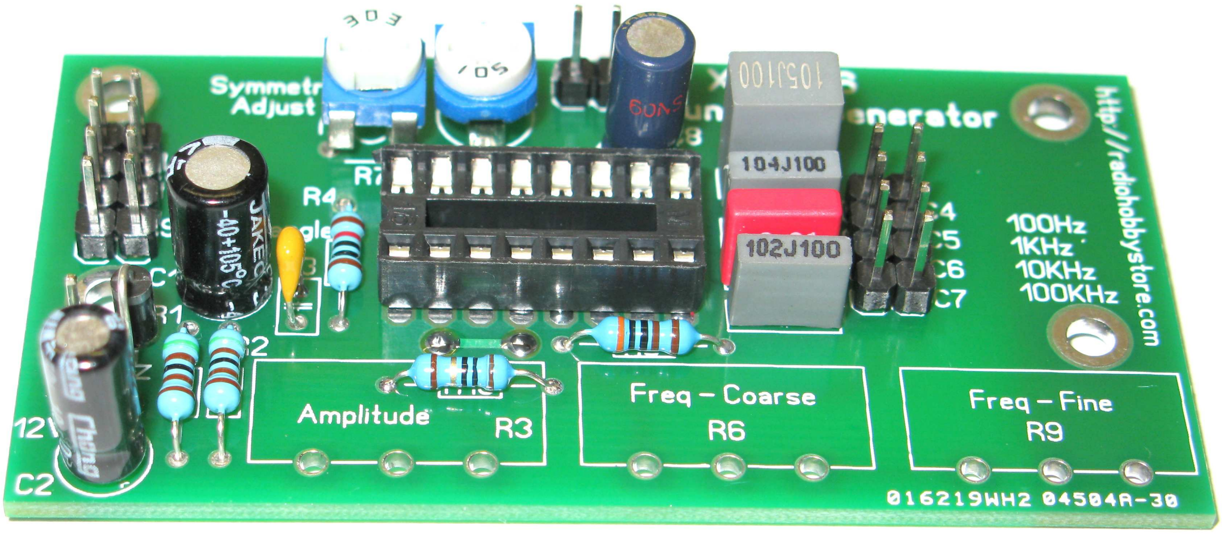
3. Solder C4, C5, C6, C7 timing polyester film box capacitors. Solder R7, R8 trimmers. If you can't reach a oscilloscope to calibrate the device please ignore the R7 installation!



4. Solder D1 protection diode. Solder C3 ceramic capacitor.

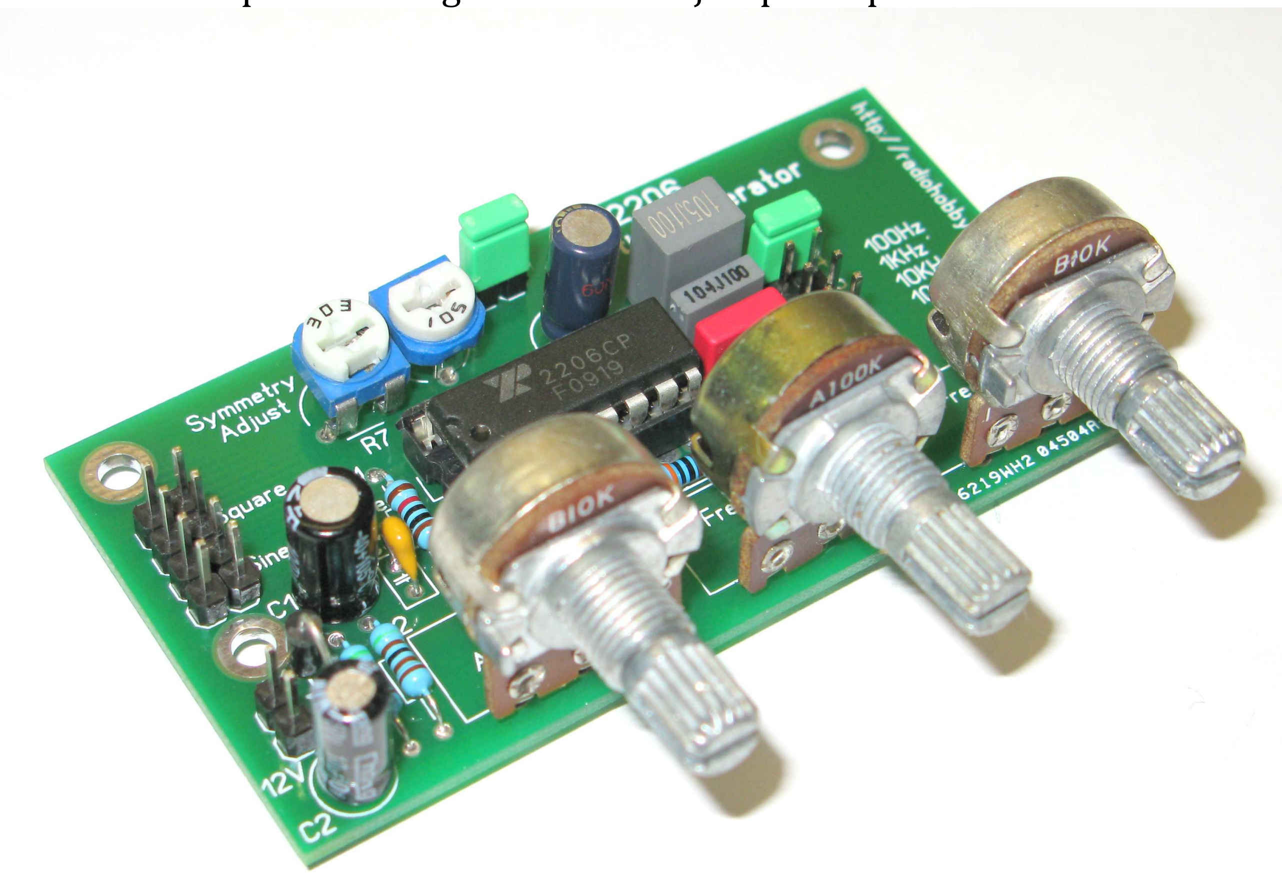


5. Solder C1, C2, C8 electrolytic capacitors.



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6. Solder R3, R6, R9 rotary potentiometers. Install IC XR2206CP into DIP 16 Socket, remember to check the IC direction regarding the circuit and components diagram. Install 2 jumper cups.



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Before the first power up.

1. Adjust R8 potentiometer to 200 Ohm before you power up the device! R8 is THD (Total Harmonic Distortion) adjustment potentiometer and we follow the value of 200 Ohm regards to the IC datasheet.
2. Check with multimeter tester that you do not have any unwanted short circuits on the board.
3. Connect your frequency counter or buffer stage amplifier to the function generator outputs (Sine/Triangle). Sine/Triangle wave form can be selected with jumper 5. Closed is for sinewave.
4. Install jumper cup to desired frequency range.
5. Connect 12V power supply. Please be sure to connect the right polarity of + and -. Use a molex of wafer connector 2.54mm. Never just wrap the power supply wires over 2.54mm Male Pins! Use proper connector type or solder the wires directly to the pins.

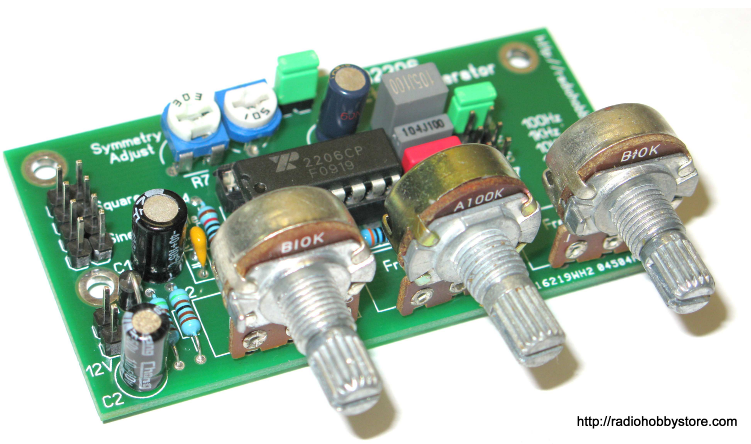
Using XR2206 Function Generator.

For non-adjustable version you only need to power up the frequency generator with 12V DC power supply.

Change the output frequency with R6 (coarse) and R9 (fine). Change the amplitude with R3.

Select the frequency range with the jumper or connect the pins to external 1 Pole 4 Position Rotary Switch.

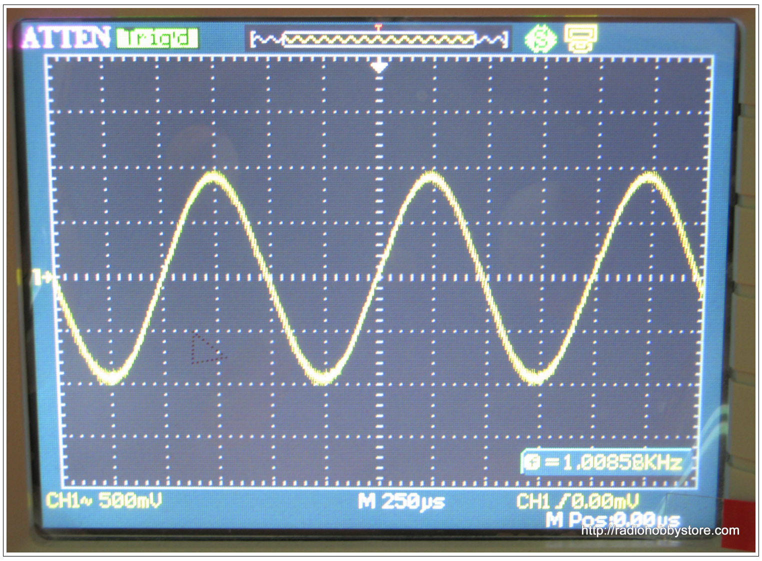
Sine/Triangle wave output can be toggled with S/T jumper or external button.



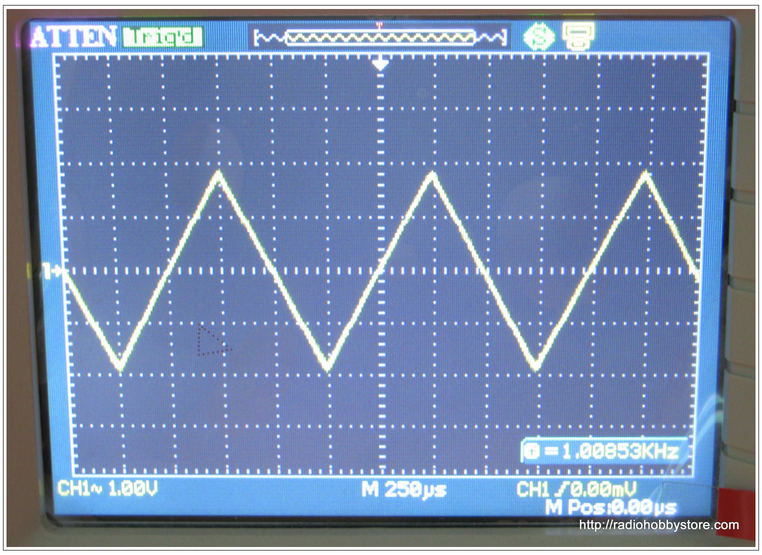
Adjustments and Experiments.

Adjustment should be made as follows:

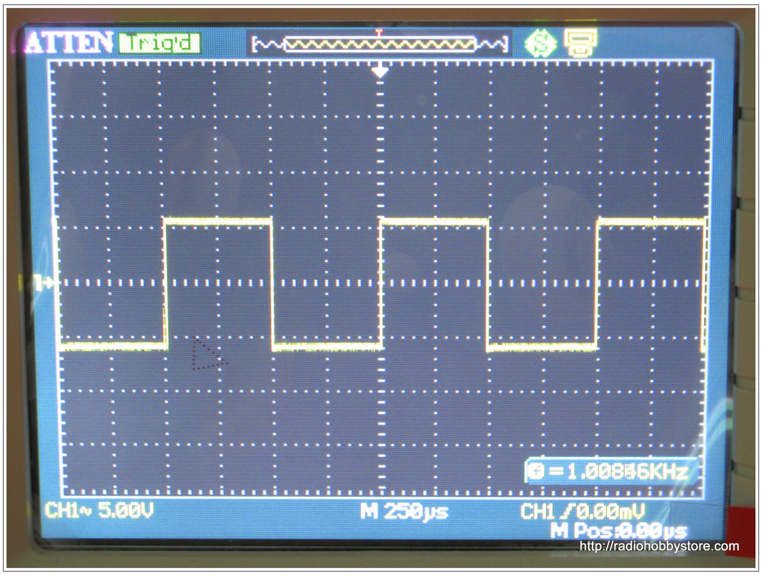
1. Set the S/T jumper to close for the sine wave output.
2. Set frequency jumper to C5 100nF.
3. Connect 12V power supply and oscilloscope probe. Power up the device.
4. Set the amplitude to the maximum with R3.
5. Set the frequency to 1KHz with R6 and R9.
6. Use a screwdriver to trim R7 to the midpoint and adjust R8 for minimum distortion.
7. With R8 set as above, adjust R7 further reduce distortion.
8. Check sine/triangle/square wave forms.



Sine Wave



Triangle Wave



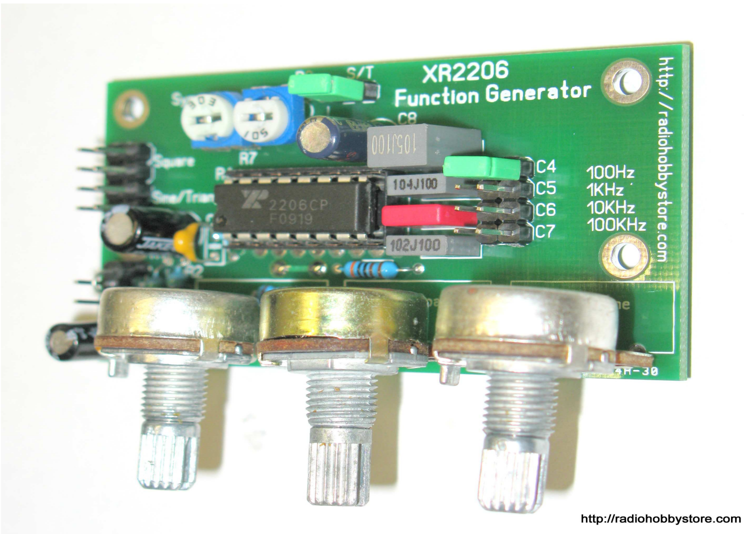
Square Wave

You can try some components value experiments, but remember not to overheat the PCB! Use a proper desoldering tools.
We can't be responsible for the results of your experiments. Please refer IC datasheet for more information about the chip.

The datasheet of XR2206 is suggest R3 potentiometer with value of 50K. But you should rise supply voltage to 23-25V to avoid signal clipping in case you'll install R3 50K.

You can still increase sine wave output level by increasing R10 to 3K-5.6K and stay with 12V power supply. But with this modification you also will increase the minimum signals level.

If you need to adjust frequency's offset please change R1, R2 ratio. You can use external 10K potentiometer instead R1, R2 resistors. The central tape should be connected to C2+ and the external tapes of the potentiometer to VCC and GND.



Technical Support:

Technical support can be given on multi-language: english, russian and hebrew. Respond time can vary, but usually during 24-36 hours you'll receive the answer. Skype Chat is preferred.

support@radiohobbystore.com

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